

**3R - 124**

# **REPORTS**

**DATE:**

**1999**

***CROSS TIMBERS OIL COMPANY***

**GROUNDWATER REMEDIATION REPORT**

**1999**

**ROWLAND GC #1  
(P) SECTION 25, T30N, R12W, NMPM  
SAN JUAN COUNTY, NEW MEXICO**

***PREPARED FOR:  
MR. WILLIAM C. OLSON  
NEW MEXICO OIL CONSERVATION DIVISION***

***FEBRUARY 2000***

***PREPARED BY:  
BLAGG ENGINEERING, INC.***

***Consulting Petroleum / Reclamation Services  
P.O. Box 87  
Bloomfield, New Mexico 87413***

**Cross Timbers Oil Company (CTOC)**  
**Rowland GC # 1 - Separator & Production Tank Pits**  
**Se/4 Se/4 Sec. 25, T30N, R12W**

**Groundwater Monitor Well Sampling Procedures:**

Groundwater samples were collected from site monitor wells (MW's) following USEPA: SW-846 protocol. The samples were collected using new disposable bailers and placed in new laboratory supplied 40 ml glass vials with teflon septa caps. Samples were analyzed for benzene, toluene, ethylbenzene, and total xylenes (BTEX) per USEPA Method 8021. Additional groundwater was collected and placed in laboratory supplied 500 ml plastic containers and analyzed for general water quality per USEPA Method 600/4-79-020. The samples were preserved cool (BTEX samples also preserved with mercuric chloride) and hand delivered to a qualified laboratory for testing. Waste generated during monitor well sampling and development was disposed of utilizing the separator tank pit located on the well site.

**Water Quality Information:**

BTEX and general water quality results for the 1999 annual sampling event are summarized in the following tables. The laboratory results for MW #4R & #5 indicate that the benzene levels continue to exceed New Mexico Water Quality Control Commission's (NMWQCC) regulatory standards (16.4 and 174 parts per billion [ppb] respectively). It should also be noted that MW #5 benzene level has decreased dramatically from the previous sampling event. The general water quality was reinvestigated to address the attached NMOCD letter, dated April 21, 1999 (see section 2). In reviewing the data, it is evident that MW #2 and #6 (down gradient MW's) show substantial differences in the amounts of total dissolve solids (TDS), chloride, fluoride, sulfates, and sodium compared to the other existing MW's.

**Summary and/or Recommendations:**

According to the enclosed documentation, the groundwater in the vicinity of the production tank pit continues to exceed the NMWQCC regulatory standards for BTEX; however, the impacted area appears to be within a relative limited area on the well pad. It seems apparent that down gradient delineation has been determined for the production tank pit based on information obtained in MW #3 and #6.

Although the groundwater flow direction has diverted to the east, it continues to travel away from the nearby irrigation ditch located west of impacted area (refer to Figure 2). Therefore, it is postulated that the irrigation ditch is the major influence of groundwater level and flow for this specific area.

It is uncertain at this time if the high levels of the pertinent general water quality constituents detected within MW #2 & #6 are a result of the activities on-site or naturally occurring. Therefore, it is proposed to install two (2) additional MW's in both the up gradient (near and east of the irrigation ditch) and down gradient (but south of all known subsurface disturbance - see Figure 2). In doing so, this will allow a determination of the influence the nearby irrigation ditch has on the groundwater quality as compared to away from it at a meaningful distance (in excess of 250 feet).

It is recommended that MW #'s 4R and #5 continue to be monitored on an annual basis until results reveal another course of action. It is also suggested to sample MW's #3 and #6 for BTEX on the next sampling event to assure down gradient delineation of the groundwater hydrocarbon contamination observed.

CTOC request the NMOCD to contact El Paso Natural Gas as to their possible involvement with the apparent subsurface soil and groundwater contamination discovered adjacent to the meter house and sale's line located up gradient of both CTOC pits being investigated.

**CROSS TIMBERS OIL CO. GROUNDWATER MONITOR WELL LAB RESULT**  
**SUBMITTED BY BLAGG ENGINEERING, INC.**

**ROWLAND GC #1 - PROD. TANK & SEP. PITS**  
**UNIT P, SEC. 25, T30N, R12W**

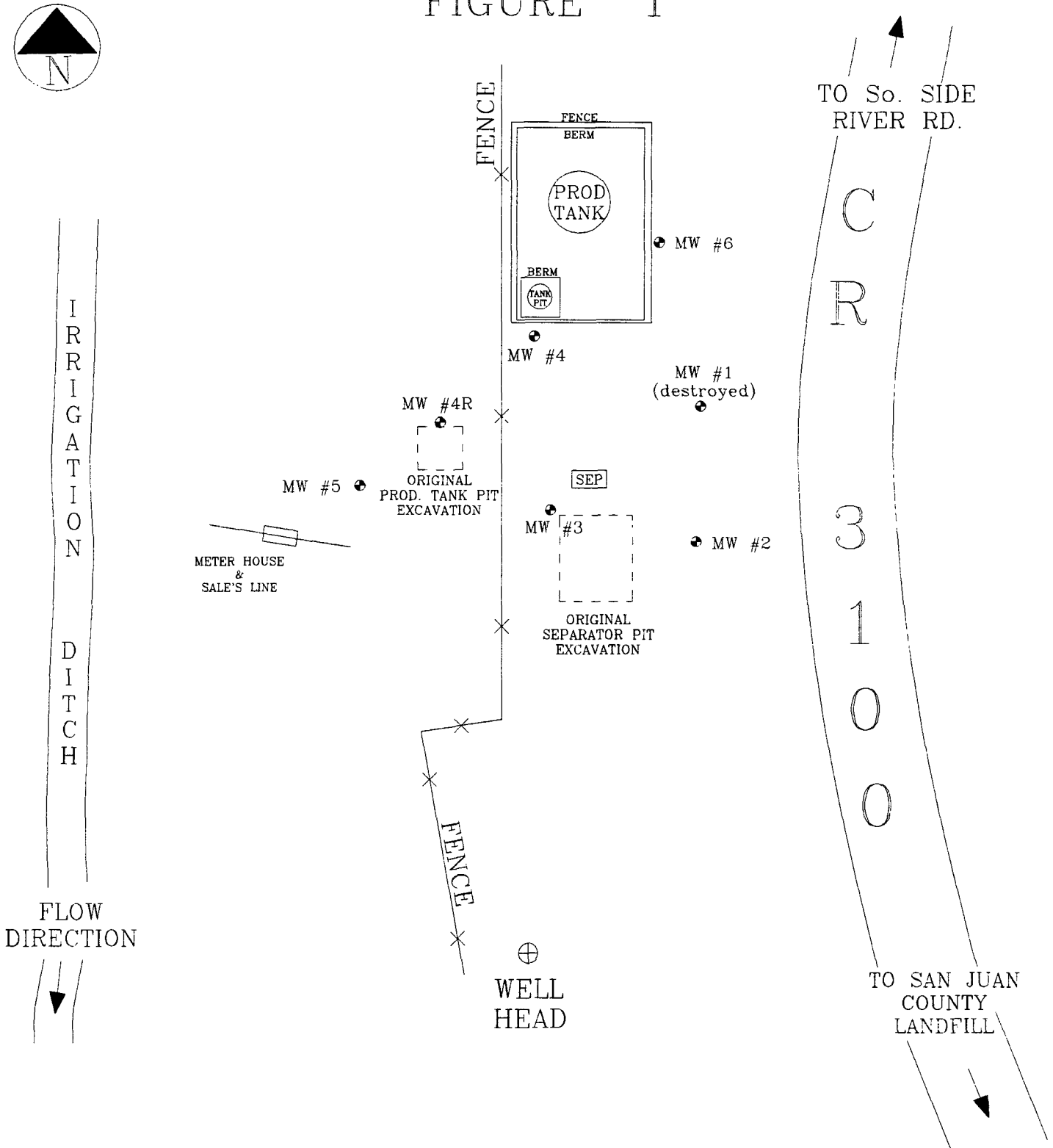
REVISED DATE: June 8, 1999  
 FILENAME: (RW-2Q-99.WK4) NJV

SAMPLE DATE	MONITOR WELL No:	D.T.W. (ft)	T.D. (ft)	TDS (mg/L)	COND. (umhos/cm)	pH	PRODUCT (ft)	BTEX EPA METHOD 8020 (PPB)			
								Benzene	Toluene	Ethyl Benzene	Total Xylene
14-Jun-96	MW #1	16.11	25.00	19200	10200	7.5		ND	ND	ND	ND
14-Jun-96	MW #2	15.44	20.00	6790	5200	6.9		ND	1.19	ND	3.41
26-May-99		15.30		9200	18500	7.4		NA	NA	NA	NA
14-Jun-96	MW #3	14.39	20.00	2740	2600	6.7		ND	ND	ND	ND
26-May-99		15.29		1550	3200	7.1		NA	NA	NA	NA
14-Jun-96	MW #4	13.72	19.00	12000	8500	6.9		94.3	2.71	ND	106.4
24-Jun-97		14.02	19.00		6800	6.9		44.7	0.5	0.4	3
26-Jun-98	MW #4R	11.52	19.09		1700	6.7		13.4	ND	ND	0.6
26-May-99		11.28		1110	2250	7.1		16.4	0.9	2.1	72.2
14-Jun-96	MW #5	10.40	16.90	972	1700	6.9		25.4	732	953	9070
24-Jun-97		10.27	15.00		2600	7.0		58.8	2.5	2.8	6290
26-Jun-98		10.34	15.00		1900	6.9		1270	89	41.4	3200
26-May-99		10.03		1016	2050	7.5		174	129	252	990
24-Jun-97	MW #6	15.55	25.00	8390	5100	7.6		ND	0.6	0.5	5.4
26-May-99		15.79		10200	20420	7.7		NA	NA	NA	NA

**GENERAL WATER QUALITY**  
**CROSS TIMBERS OIL COMPANY**  
**ROWLAND GC # 1**  
**SAMPLE DATE : MAY 26, 1999**

PARAMETERS	MW # 2	MW # 3	MW # 4R	MW # 5	MW # 6	Units
LAB pH	7.35	7.11	7.06	7.52	7.67	s. u.
LAB CONDUCTIVITY @ 25 C	18,500	3,200	2,250	2,050	20,420	umhos / cm
TOTAL DISSOLVED SOLIDS @ 180 C	9,200	1,550	1,110	1,016	10,200	mg / L
TOTAL DISSOLVED SOLIDS (Calc)	9,111	1,480	1,076	1,010	10,026	mg / L
SODIUM ABSORPTION RATIO	34.8	5.3	2.7	0.2	30.6	ratio
TOTAL ALKALINITY AS CaCO <sub>3</sub>	536	496	576	880	352	mg / L
TOTAL HARDNESS AS CaCO <sub>3</sub>	1,048	560	584	872	1,456	mg / L
BICARBONATE as HCO <sub>3</sub>	536	496	576	880	352	mg / L
CARBONATE AS CO <sub>3</sub>	< 1	< 1	< 1	< 1	< 1	mg / L
HYDROXIDE AS OH	< 1	< 1	< 1	< 1	< 1	mg / L
NITRATE NITROGEN	190	6.6	0.4	0.3	220	mg / L
NITRITE NITROGEN	0.214	0.083	0.027	0.016	0.940	mg / L
CHLORIDE	644	188	160	112	560	mg / L
FLUORIDE	1.43	0.48	0.67	0.36	1.54	mg / L
PHOSPHATE	0.5	0.7	0.1	2.0	0.4	mg / L
SULFATE	4,980	490	200	21.0	5800	mg / L
IRON	0.001	0.017	0.003	0.519	0.012	mg / L
CALCIUM	298	160	179	285	477	mg / L
MAGNESIUM	74.2	39.1	33.2	39.1	64.5	mg / L
POTASSIUM	7.5	4.0	3.0	1.1	7.5	mg / L
SODIUM	2590	290	150	14.8	2680	mg / L
CATION / ANION DIFFERENCE	0.03	0.54	0.56	0.02	0.07	%

# FIGURE 1



MONITOR WELL LOCATIONS ARE ONLY AS ACCURATE AS THE INSTRUMENTS USED IN OBTAINING THE FOOTAGE AND BEARING FROM THE WELL HEAD (BRUNTON COMPASS AND LASER RANGE FINDER). ALL OTHER STRUCTURES DISPLAYED ON THE SITE MAP ARE SOLELY FOR REFERENCE AND ARE NOT TO SCALE.

0 50 100 FT.

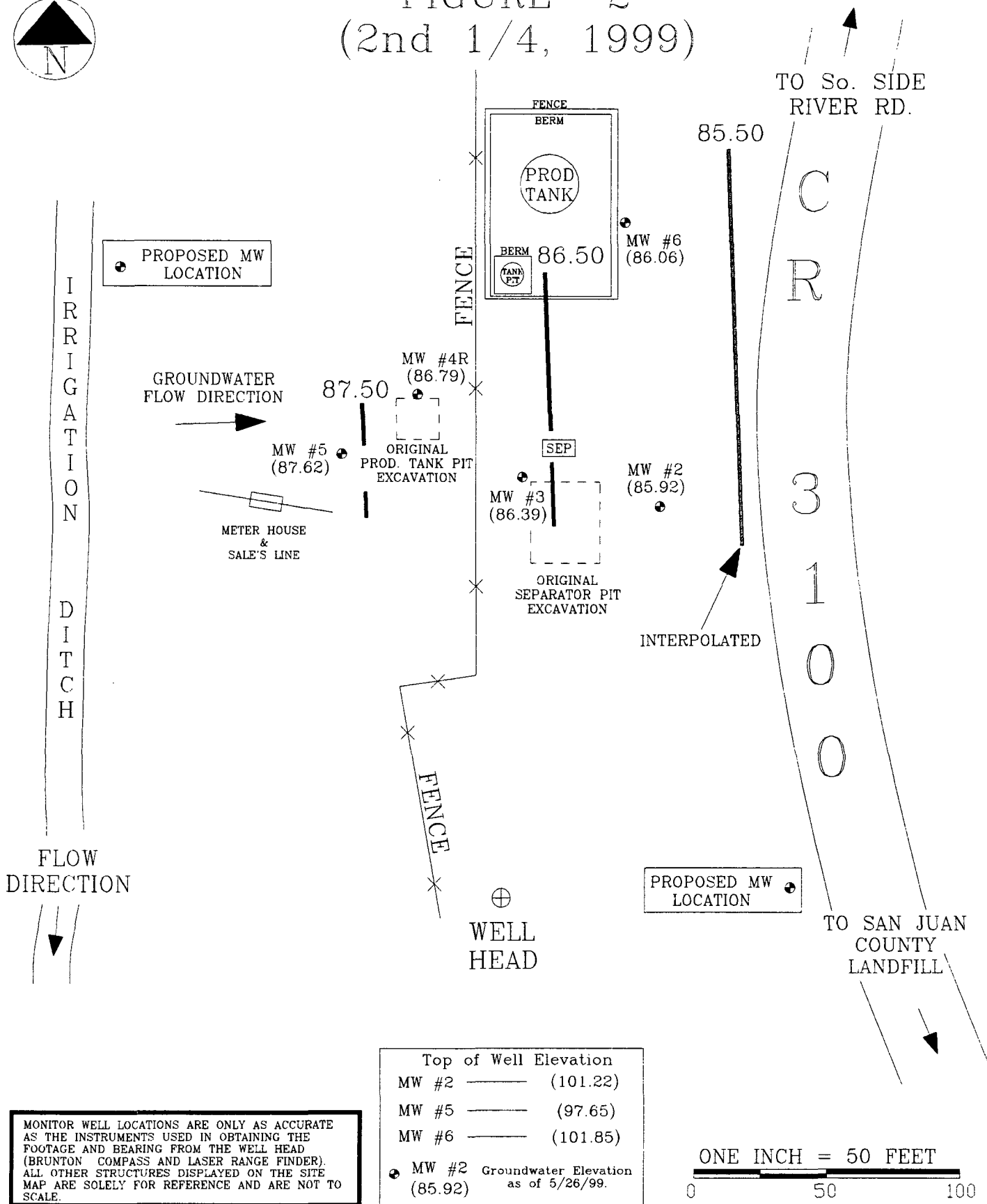
AMOCO PRODUCTION COMPANY  
ROWLAND GC 1  
NE/4 NW/4 SEC. 25, T30N, R12W  
SAN JUAN COUNTY, NEW MEXICO

BLAGG ENGINEERING, INC.  
CONSULTING PETROLEUM / RECLAMATION SERVICES  
P.O. BOX 87  
BLOOMFIELD, NEW MEXICO 87413  
PHONE: (505) 632-1199

PROJECT: ANNUAL SAMP.  
DRAWN BY: NJV  
FILENAME: 05-26-SM  
REVISED: 2/2/00 NJV

SITE  
MAP  
5/99

FIGURE 2  
(2nd 1/4, 1999)



AMOCO PRODUCTION COMPANY

ROWLAND GC 1

NE/4 NW/4 SEC. 25, T30N, R12W

SAN JUAN COUNTY, NEW MEXICO

BLAGG ENGINEERING, INC.

CONSULTING PETROLEUM / RECLAMATION SERVICES

P.O. BOX 87  
BLOOMFIELD, NEW MEXICO 87413

PHONE: (505) 632-1199

PROJECT: ANNUAL SAMP.

DRAWN BY: NJV

FILENAME: 05-26-SM

REVISED: 2/2/00 NJV

GROUNDWATER

GRADIENT

MAP

5/99

**BLAGG ENGINEERING, INC.**  
MONITOR WELL SAMPLING DATA

CLIENT : AMOCO PRODUCTION CO.

CHAIN-OF-CUSTODY # : 6686

ROWLAND GC # 1 - SEPARATOR PIT  
UNIT P, SEC. 25, T30N, R12W

LABORATORY (S) USED : ENVIROTECH, INC.

Date : May 26, 1999

SAMPLER : N J V

Filename : 05-26-99.WK4

PROJECT MANAGER : N J V

WELL #	WELL ELEV. (ft)	WATER ELEV. (ft)	DEPTH TO WATER (ft)	TOTAL DEPTH (ft)	SAMPLING TIME	pH	CONDUCT (umhos)	VOLUME PURGED (gal.)	FREE PRODUCT (ft)
2	101.22	85.92	15.30	20.00	1145	-	-	2.25	-
3	101.68	86.39	15.29	20.00	1215	-	-	2.25	-
4R	98.07	86.79	11.28	19.09	1245	-	-	4.00	-
5	97.65	87.62	10.03	15.00	1315	-	-	2.50	-
6	101.85	86.06	15.79	25.00	1345	-	-	4.50	-

NOTES : Volume of water purged from well prior to sampling:  $V = \pi \times r^2 \times h \times 7.48 \text{ gal./ft}^3 \times 3 \text{ (wellbores)}$ .  
(i.e. 2" MW  $r = (1/12) \text{ ft}$ .  $h = 1 \text{ ft}$ . ) (i.e. 4" MW  $r = (2/12) \text{ ft}$ .  $h = 1 \text{ ft}$ .)

Ideally a minimum of three (3) wellbore volumes:

1.25 " well diameter = 0.19 gallons per foot of water ( or 24 oz. ).

2 bails per foot - small teflon bailer.

3 bails per foot - 3 / 4 " teflon bailer.

2.00 " well diameter = 0.49 gallons per foot of water.

4.00 " well diameter = 1.95 gallons per foot of water.

Comments or note well diameter if not standard 2 ".

MW # 1 destroyed during revamp of surface equipment . MW # 2 top of casing broken off

( measured @ 2.02 ft. Collected BTEX for MW #'s 4R & 5 only . Collected anion / cation

for all MW's listed above .



# ENVIROTECH LABS

PRACTICAL SOLUTIONS FOR A BETTER TOMORROW

## EPA METHOD 8021 AROMATIC VOLATILE ORGANICS

Client:	Blagg / Cross Timbers	Project #:	403410
Sample ID:	MW # 4R	Date Reported:	05-27-99
Chain of Custody:	6686	Date Sampled:	05-26-99
Laboratory Number:	F405	Date Received:	05-27-99
Sample Matrix:	Water	Date Analyzed:	05-27-99
Preservative:	HgCl <sub>2</sub> & Cool	Analysis Requested:	BTEX
Condition:	Cool & Intact		

Parameter	Concentration (ug/L)	Dilution Factor	Det. Limit (ug/L)
Benzene	16.4	1	0.2
Toluene	0.9	1	0.2
Ethylbenzene	2.1	1	0.2
p,m-Xylene	56.0	1	0.2
o-Xylene	16.2	1	0.1

**Total BTEX** 91.6

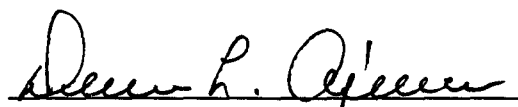
ND - Parameter not detected at the stated detection limit.

Surrogate Recoveries:	Parameter	Percent Recovery
	Trifluorotoluene	99 %
	Bromofluorobenzene	99 %

References: Method 5030B, Purge-and-Trap, Test Methods for Evaluating Solid Waste, SW-846, USEPA, December 1996.

Method 8021B, Aromatic and Halogenated Volatiles by Gas Chromatography Using Photoionization and/or Electrolytic Conductivity Detectors, SW-846, USEPA December 1996.

Comments: Rowland GC #1.

  
Analyst

  
Review

# ENVIROTECH LABS

PRACTICAL SOLUTIONS FOR A BETTER TOMORROW

## EPA METHOD 8021 AROMATIC VOLATILE ORGANICS

Client:	Blagg / Cross Timbers	Project #:	403410
Sample ID:	MW # 5	Date Reported:	05-27-99
Chain of Custody:	6686	Date Sampled:	05-26-99
Laboratory Number:	F406	Date Received:	05-27-99
Sample Matrix:	Water	Date Analyzed:	05-27-99
Preservative:	HgCl <sub>2</sub> & Cool	Analysis Requested:	BTEX
Condition:	Cool & Intact		

Parameter	Concentration (ug/L)	Dilution Factor	Det. Limit (ug/L)
Benzene	174	10	1.8
Toluene	129	10	1.7
Ethylbenzene	252	10	1.5
p,m-Xylene	731	10	2.2
o-Xylene	259	10	1.0

Total BTEX 1,550

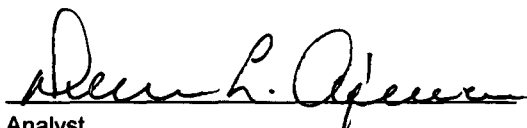
ND - Parameter not detected at the stated detection limit.

Surrogate Recoveries:	Parameter	Percent Recovery
	Trifluorotoluene	96 %
	Bromofluorobenzene	96 %

References: Method 5030B, Purge-and-Trap, Test Methods for Evaluating Solid Waste, SW-846, USEPA, December 1996.

Method 8021B, Aromatic and Halogenated Volatiles by Gas Chromatography Using Photoionization and/or Electrolytic Conductivity Detectors, SW-846, USEPA December 1996.

Comments: Rowland GC #1.

  
Analyst

  
Review

# ENVIROTECH LABS

PRACTICAL SOLUTIONS FOR A BETTER TOMORROW

## CATION / ANION ANALYSIS

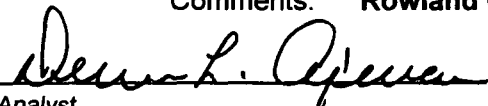
Client: Blagg / Cross Timbers  
Sample ID: MW #2  
Laboratory Number: F403  
Chain of Custody: 6686  
Sample Matrix: Water  
Preservative: Cool  
Condition: Cool & Intact

Project #: 403410  
Date Reported: 05-28-99  
Date Sampled: 05-26-99  
Date Received: 05-27-99  
Date Extracted: N/A  
Date Analyzed: 05-28-99

Parameter	Analytical Result	Units	Units
pH	7.35	s.u.	
Conductivity @ 25° C	18,500	umhos/cm	
Total Dissolved Solids @ 180C	9,200	mg/L	
Total Dissolved Solids (Calc)	9,111	mg/L	
SAR	34.8	ratio	
Total Alkalinity as CaCO3	536	mg/L	
Total Hardness as CaCO3	1,048	mg/L	
Bicarbonate as HCO3	536	mg/L	8.79 meq/L
Carbonate as CO3	<1	mg/L	0.00 meq/L
Hydroxide as OH	<1	mg/L	0.00 meq/L
Nitrate Nitrogen	190	mg/L	3.06 meq/L
Nitrite Nitrogen	0.214	mg/L	0.00 meq/L
Chloride	644	mg/L	18.17 meq/L
Fluoride	1.43	mg/L	0.08 meq/L
Phosphate	0.5	mg/L	0.02 meq/L
Sulfate	4,980	mg/L	103.68 meq/L
Iron	0.001	mg/L	
Calcium	298	mg/L	14.87 meq/L
Magnesium	74.2	mg/L	6.11 meq/L
Potassium	7.5	mg/L	0.19 meq/L
Sodium	2,590	mg/L	112.67 meq/L
Cations			133.83 meq/L
Anions			133.80 meq/L
Cation/Anion Difference			0.03%

Reference: U.S.E.P.A., 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes", 1983.  
Water And Waste Water", 18th ed., 1992.

Comments: Rowland GC #1.

  
Analyst

  
Review

# ENVIROTECH LABS

PRACTICAL SOLUTIONS FOR A BETTER TOMORROW

## CATION / ANION ANALYSIS

Client: Blagg / Cross Timbers  
Sample ID: MW #3  
Laboratory Number: F404  
Chain of Custody: 6686  
Sample Matrix: Water  
Preservative: Cool  
Condition: Cool & Intact


Project #: 403410  
Date Reported: 05-28-99  
Date Sampled: 05-26-99  
Date Received: 05-27-99  
Date Extracted: N/A  
Date Analyzed: 05-28-99

Parameter	Analytical Result	Units		Units
pH	7.11	s.u.		
Conductivity @ 25° C	3,200	umhos/cm		
Total Dissolved Solids @ 180C	1,550	mg/L		
Total Dissolved Solids (Calc)	1,480	mg/L		
SAR	5.3	ratio		
Total Alkalinity as CaCO3	496	mg/L		
Total Hardness as CaCO3	560	mg/L		
Bicarbonate as HCO3	496	mg/L	8.13	meq/L
Carbonate as CO3	<1	mg/L	0.00	meq/L
Hydroxide as OH	<1	mg/L	0.00	meq/L
Nitrate Nitrogen	6.6	mg/L	0.11	meq/L
Nitrite Nitrogen	0.083	mg/L	0.00	meq/L
Chloride	188	mg/L	5.30	meq/L
Fluoride	0.48	mg/L	0.03	meq/L
Phosphate	0.7	mg/L	0.02	meq/L
Sulfate	490	mg/L	10.20	meq/L
Iron	0.017	mg/L		
Calcium	160	mg/L	7.98	meq/L
Magnesium	39.1	mg/L	3.22	meq/L
Potassium	4.0	mg/L	0.10	meq/L
Sodium	290	mg/L	12.62	meq/L
Cations			23.92	meq/L
Anions			23.79	meq/L
Cation/Anion Difference			0.54%	

Reference: U.S.E.P.A., 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes", 1983.  
Water And Waste Water", 18th ed., 1992.

Comments: Rowland GC #1.

  
Analyst

  
Review

# ENVIROTECH LABS

PRACTICAL SOLUTIONS FOR A BETTER TOMORROW

## CATION / ANION ANALYSIS

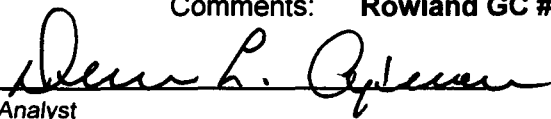
Client: Blagg / Cross Timbers  
Sample ID: MW #4R  
Laboratory Number: F405  
Chain of Custody: 6686  
Sample Matrix: Water  
Preservative: Cool  
Condition: Cool & Intact


Project #: 403410  
Date Reported: 05-28-99  
Date Sampled: 05-26-99  
Date Received: 05-27-99  
Date Extracted: N/A  
Date Analyzed: 05-28-99

Parameter	Analytical Result	Units		Units
pH	7.06	s.u.		
Conductivity @ 25° C	2,250	umhos/cm		
Total Dissolved Solids @ 180C	1,110	mg/L		
Total Dissolved Solids (Calc)	1,076	mg/L		
SAR	2.7	ratio		
Total Alkalinity as CaCO3	576	mg/L		
Total Hardness as CaCO3	584	mg/L		
Bicarbonate as HCO3	576	mg/L	9.44	meq/L
Carbonate as CO3	<1	mg/L	0.00	meq/L
Hydroxide as OH	<1	mg/L	0.00	meq/L
Nitrate Nitrogen	0.4	mg/L	0.01	meq/L
Nitrite Nitrogen	0.027	mg/L	0.00	meq/L
Chloride	160	mg/L	4.51	meq/L
Fluoride	0.67	mg/L	0.04	meq/L
Phosphate	0.1	mg/L	0.00	meq/L
Sulfate	200	mg/L	4.16	meq/L
Iron	0.003	mg/L		
Calcium	179	mg/L	8.93	meq/L
Magnesium	33.2	mg/L	2.73	meq/L
Potassium	3.0	mg/L	0.08	meq/L
Sodium	150	mg/L	6.53	meq/L
Cations			18.27	meq/L
Anions			18.16	meq/L
Cation/Anion Difference			0.56%	

Reference: U.S.E.P.A., 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes", 1983.  
Water And Waste Water", 18th ed., 1992.

Comments: Rowland GC #1.

  
Analyst

  
Review

# ENVIROTECH LABS

PRACTICAL SOLUTIONS FOR A BETTER TOMORROW

## CATION / ANION ANALYSIS

Client: Blagg / Cross Timbers  
Sample ID: MW #5  
Laboratory Number: F406  
Chain of Custody: 6686  
Sample Matrix: Water  
Preservative: Cool  
Condition: Cool & Intact

Project #: 403410  
Date Reported: 05-28-99  
Date Sampled: 05-26-99  
Date Received: 05-27-99  
Date Extracted: N/A  
Date Analyzed: 05-28-99

Parameter	Analytical Result	Units	Units
pH	7.52	s.u.	
Conductivity @ 25° C	2,050	umhos/cm	
Total Dissolved Solids @ 180C	1,016	mg/L	
Total Dissolved Solids (Calc)	1,010	mg/L	
SAR	0.2	ratio	
Total Alkalinity as CaCO3	880	mg/L	
Total Hardness as CaCO3	872	mg/L	
Bicarbonate as HCO3	880	mg/L	14.42 meq/L
Carbonate as CO3	<1	mg/L	0.00 meq/L
Hydroxide as OH	<1	mg/L	0.00 meq/L
Nitrate Nitrogen	0.3	mg/L	0.00 meq/L
Nitrite Nitrogen	0.016	mg/L	0.00 meq/L
Chloride	112	mg/L	3.16 meq/L
Fluoride	0.36	mg/L	0.02 meq/L
Phosphate	2.0	mg/L	0.06 meq/L
Sulfate	21.0	mg/L	0.44 meq/L
Iron	0.519	mg/L	
Calcium	285	mg/L	14.22 meq/L
Magnesium	39.1	mg/L	3.22 meq/L
Potassium	1.1	mg/L	0.03 meq/L
Sodium	14.8	mg/L	0.64 meq/L
Cations			18.11 meq/L
Anions			18.11 meq/L
Cation/Anion Difference			0.02%

Reference: U.S.E.P.A., 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes", 1983.  
Water And Waste Water", 18th ed., 1992.

Comments: Rowland GC #1.

Analyst

Review

# ENVIROTECH LABS

PRACTICAL SOLUTIONS FOR A BETTER TOMORROW

## CATION / ANION ANALYSIS

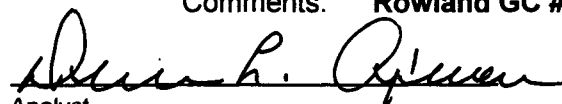
Client: Blagg / Cross Timbers  
Sample ID: MW #6  
Laboratory Number: F407  
Chain of Custody: 6686  
Sample Matrix: Water  
Preservative: Cool  
Condition: Cool & Intact

Project #: 403410  
Date Reported: 05-28-99  
Date Sampled: 05-26-99  
Date Received: 05-27-99  
Date Extracted: N/A  
Date Analyzed: 05-28-99

Parameter	Analytical Result	Units	Units
pH	7.67	s.u.	
Conductivity @ 25° C	20,420	umhos/cm	
Total Dissolved Solids @ 180C	10,200	mg/L	
Total Dissolved Solids (Calc)	10,026	mg/L	
SAR	30.6	ratio	
Total Alkalinity as CaCO3	352	mg/L	
Total Hardness as CaCO3	1,456	mg/L	
Bicarbonate as HCO3	352	mg/L	5.77 meq/L
Carbonate as CO3	<1	mg/L	0.00 meq/L
Hydroxide as OH	<1	mg/L	0.00 meq/L
Nitrate Nitrogen	220	mg/L	3.55 meq/L
Nitrite Nitrogen	0.940	mg/L	0.02 meq/L
Chloride	560	mg/L	15.80 meq/L
Fluoride	1.54	mg/L	0.08 meq/L
Phosphate	0.4	mg/L	0.01 meq/L
Sulfate	5,800	mg/L	120.76 meq/L
Iron	0.012	mg/L	
Calcium	477	mg/L	23.80 meq/L
Magnesium	64.5	mg/L	5.31 meq/L
Potassium	7.5	mg/L	0.19 meq/L
Sodium	2,680	mg/L	116.58 meq/L
Cations			145.88 meq/L
Anions			145.99 meq/L
Cation/Anion Difference			0.07%

Reference: U.S.E.P.A., 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes", 1983.  
Water And Waste Water", 18th ed., 1992.

Comments: Rowland GC #1.

  
Analyst

  
Review

# CHAIN OF CUSTODY RECORD

6686

Client / Project Name		Project Location		ANALYSIS / PARAMETERS																			
BAGG/CROSS TIMBERS		LOWLAND GC #1																					
Sampler: NJV		Client No. 403410																					
Sample No./ Identification	Sample Date	Sample Time	Lab Number	Sample Matrix	No. of Containers	ANION/ CATION (8021)	BTEX				Remarks												
MW # 2	5/26/99	1145	F403	WATER	1	✓					ALL SAMPLES PRESERV. - COOL BTEX'S PRESERV. HgCl <sub>2</sub> & COOL												
MW # 3	5/26/99	1245	F404	WATER	1	✓																	
MW # 4R	5/26/99	1245	F405	WATER	3	✓	✓																
MW # 5	5/26/99	1315	F406	WATER	3	✓	✓																
MW # 6	5/26/99	1345	F407	WATER	1	✓																	
Relinquished by: (Signature)		Date		Time		Received by: (Signature)		Date		Time													
[Signature]		5/27/99		0740		[Signature]		5-27-99		740													
Relinquished by: (Signature)						Received by: (Signature)																	
Relinquished by: (Signature)						Received by: (Signature)																	
<div> <div>ENVIROTECH INC.</div> <div> 5796 U.S. Highway 64  Farmington, New Mexico 87401  (505) 632-0615 </div> </div>																							
Sample Receipt																							
<table border="1"> <tr> <td>Y</td> <td>N</td> <td>N/A</td> </tr> <tr> <td></td> <td>✓</td> <td></td> </tr> <tr> <td colspan="3">Received Intact</td> </tr> <tr> <td colspan="3">Cool - Ice/Blue Ice</td> </tr> </table>												Y	N	N/A		✓		Received Intact			Cool - Ice/Blue Ice		
Y	N	N/A																					
	✓																						
Received Intact																							
Cool - Ice/Blue Ice																							



# ENVIROTECH LABS

PRACTICAL SOLUTIONS FOR A BETTER TOMORROW

## EPA METHOD 8021 AROMATIC VOLATILE ORGANICS QUALITY ASSURANCE REPORT

Client:	N/A	Project #:	N/A
Sample ID:	05-27-BTEX QA/QC	Date Reported:	05-27-99
Laboratory Number:	F398	Date Sampled:	N/A
Sample Matrix:	Water	Date Received:	N/A
Preservative:	N/A	Date Analyzed:	05-27-99
Condition:	N/A	Analysis:	BTEX

Calibration and Detection Limits (ug/L)	I-Cal RF:	C-Cal RF:	%Diff.	Blank Conc	Detect Limit
		Accept. Range 0 - 15%			
Benzene	1.6360E-002	1.6412E-002	0.32%	ND	0.2
Toluene	1.7563E-002	1.7566E-002	0.02%	ND	0.2
Ethylbenzene	7.1313E-003	7.1398E-003	0.12%	ND	0.2
p,m-Xylene	8.5740E-003	8.5758E-003	0.02%	ND	0.2
o-Xylene	7.9281E-003	7.9520E-003	0.30%	ND	0.1

Duplicate Conc. (ug/L)	Sample	Duplicate	%Diff.	Accept Limit
Benzene	78.9	79.0	0.1%	0 - 30%
Toluene	22.0	22.2	0.9%	0 - 30%
Ethylbenzene	51.6	52.1	1.0%	0 - 30%
p,m-Xylene	207	216	4.4%	0 - 30%
o-Xylene	66.9	67.4	0.7%	0 - 30%

Spike Conc. (ug/L)	Sample	Amount Spiked	Spiked Sample	% Recovery	Accept Limits
Benzene	78.9	50.0	128	99%	39 - 150
Toluene	22.0	50.0	72.0	100%	46 - 148
Ethylbenzene	51.6	50.0	102	100%	32 - 160
p,m-Xylene	207	100.0	305	99%	46 - 148
o-Xylene	66.9	50.0	117	100%	46 - 148

ND - Parameter not detected at the stated detection limit.

\* - Administrative Limits set at 80 - 120%.

References: Method 5030B, Purge-and-Trap, Test Methods for Evaluating Solid Waste, SW-846, USEPA, December 1996.  
Method 8021B, Aromatic and Halogenated Volatiles by Gas Chromatography Using Photoionization and/or Electrolytic Conductivity Detectors, SW-846, USEPA December 1996.

Comments: QA/QC for samples F398 - F400, F405 - F406 and F408 - F409.

Analyst

Review



STATE OF NEW MEXICO  
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

2040 S. PACHECO  
SANTA FE, NEW MEXICO 87505  
(505) 827-7131

April 21, 1999

**CERTIFIED MAIL**  
**RETURN RECEIPT NO: Z-274-520-641**

Ms. Nina Hutton  
Cross Timbers Oil Company  
810 Houston St., Suite 2000  
Fort Worth, Texas 76102-6298

**RE: SAN JUAN BASIN GROUND WATER MONITORING REPORTS**

Dear Ms. Hutton:

The New Mexico Oil Conservation Division (OCD) has reviewed Cross Timbers Oil Company's (CTOC) February 11, 1999 "CROSS TIMBERS OIL CO. GROUNDWATER MONITORING (AMOCO) 1996-1998 REPORTS, SAN JUAN COUNTY, NEW MEXICO" which was submitted on behalf of CTOC by their consultant Blagg Engineering, Inc. This document contains the results of CTOC's investigation, remediation and monitoring of ground water contamination related to the disposal of oilfield wastes in unlined pits at 7 sites in the San Juan Basin.

Based upon a review of the above referenced documents, the OCD has the following comments and requirements:

1. The downgradient and/or lateral extent of chloride and/or total dissolved solids contamination at the sites listed below has not been completely defined. The OCD requires that CTOC completely define the extent of these contaminants at each site pursuant to the previously approved ground water management plan for these sites.
  - Bergin GC #1E Unit F, Sec. 21, T29N, R11W
  - Rowland GC #1 Unit P, Sec. 25, T30N, R12W
  - State GC BS #1 Unit F, Sec. 21, T29N, R11W
  - Sullivan GC D#1 Unit B, Sec. 26, T29N, R11W
2. The downgradient and/or lateral extent of benzene, toluene, ethylbenzene, xylene (BTEX), chloride and/or total dissolved solids contamination at the sites listed below has not been completely defined. The OCD requires that CTOC completely define the extent of these contaminants at each site pursuant to the previously approved ground water management plan for these sites.
  - Bruington GC #1 Unit E, Sec. 14, T29N, R11W
  - Valdez A #1E Unit G, Sec. 24, T29N, R11W

3. A review of the sampling data shows that during some samplings only ground water from the monitor wells at the source is sampled and there is no downgradient monitoring to show that contaminated ground water is contained. In order to effectively monitor contaminant migration, the OCD requires that the ground water monitoring plan be modified to include additional ground water sampling of all monitor wells at each site on an annual basis. During the annual sampling event ground water from all monitor wells will be sampled and analyzed for BTEX, TDS, polynuclear aromatic hydrocarbons (PAH) and New Mexico Water Quality Control Commission (WQCC) cations and anions and metals using EPA approved methods and quality assurance/quality control procedures. Specific analytes may be dropped from the annual sampling event for certain sites if that analyte has not been found to be above WQCC standard in the sites source areas and the reasons for dropping those analytes are included in the annual reports. This sampling requirement will also be added to the ground water monitoring plan for all future ground water sampling at all CTOC sites with contaminated ground water.
4. CTOC recently purchased a number of well sites in the San Juan Basin from Amoco. Some of these sites were found to have ground water contamination which was discovered by Amoco during pit closure activities. The OCD does not have a listing of status of these sites. Please provide the OCD with a listing of all CTOC well sites in the San Juan Basin at which the presence of ground water was discovered during pit assessment or closure activities and the status of each site.

If you have any questions, please contact me at (505) 827-7154.

Sincerely,



William C. Olson  
Hydrologist  
Environmental Bureau

xc: Denny Foust, OCD Aztec District Office  
Nelson Velez, Blagg Engineering, Inc.